long-tailed macaques shot by Fooden in northern Thailand). One can hardly believe that the fibrous leaves are digested so quickly and completely by unspecialised guts as to vanish soon after eating.

Although it covers only the authors' home ground, this 1977 publication contains very few references later than 1972 and few references to work in progress during the intervening years. This is no idle quibble: great advances, especially in field studies, have been made during those years. The entire Smithsonian primate programme in Sri Lanka, including the uniquely rigorous ecological work of the Hladiks published in 1972 and 1975, is ignored.

In sum, Roonwall and Mohnot have amassed a very useful body of data and references, but it is out of date in content and outlook, descriptive rather than analytical, and poorly presented. One is left with the feeling that the authors simply did not make an effort to get up to date or to organise their book to suit the reader. This reader resents being made to do the authors' work.

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The orang utan is the world's largest truly tree-living creature, confined today to the rain forests of Borneo and Sumatra. Whatever you may wish to know about the Sumatran orang, Rijksen doubtless says something on the subject in this comprehensive book, which is in fact his doctoral thesis. It begins with introductory chapters about the orang, about previous field research on it and about the Sumatran environment. It moves on to the ecology of the orang and, briefly but pertinently, that of the other monkeys and apes which live in the study area. An exhaustive description follows of the orang's social behaviour, and then a discussion of the role of natural selection in shaping its way of life. The book ends with a strong section on conservation.
The book is well organised, moving smoothly from one topic to another in a logical sequence. This is not nearly as easy to achieve as the product suggests. Many a thesis-writer has racked his or her brains over how to order the material, because one point cannot be made without reference to another and vice-versa. The final order of presentation is usually the writer's second-last decision (the last being what was his objective). The material is amply illustrated by tables and diagrams, and by photographs which are descriptive and sensitive. One of these (by Anton Fernhout, on p. 116) grasps better than any other I know the essence of the gibbon ape's place in its forest world. The presentation is spoilt by a binding which falls apart when you look at it.

The breadth of the book's approach is its strong point as an education and as an amusement. It is also its weak point as a thesis—for there is no central thesis. Had the writer asked fewer questions he might have answered them more conclusively. Much of the account is purely descriptive with no quantification, and it lacks any statistical tests. While this would be unacceptable to many academics, one should nevertheless thank Rijksen for seeing his data for what they are and not slapping spuriously convincing 95% confidence limits where 'it is my opinion that' is nearer the truth. The reader passes judgement on such a work by whether or not he believes the writer, and I certainly believe Rijksen (with some exceptions mentioned below).

Though lacking a central theme, the book contains some stimulating discussions along the way. In one of these Rijksen raises the paradox between the orang's evident intelligence and its primitive social life. The orang is exceptional among the higher primates in being solitary. Alison Jolly and Nick Humphrey have each independently suggested that the intelligence of the higher primates has been selected for by the advantage of coping with the complexities of living in a stable, socially active group. A typical primate group might contain 20 animals. This means 190 simple relationships between any two animals, not to mention more involved relationships. A group of 100 produces 4950 pairs. One begins to see the force of the argument.... Rijksen suggests that the orang retains its intelligence from an earlier more social stage. Noting that fossil orangs are also bigger than
living ones, he postulates that the orang used to be a more ground-living and more social creature, which has been forced into its present solitary tree-living state by competition with, and hunting by, man. The yawning gap of several million years between the oldest fossil oranges and their most recent possible ancestors leaves plenty of room for this speculation. Unfortunately, as Rijksen points out, the chimpanzee has probably been subjected to very similar pressures in Africa, yet is now a mainly ground-living and very social ape. This case points up the general difficulty of relating the types of social systems which primate species possess to the pressures of their environments, an inquiry which has occupied much of the effort of primatologists for disappointingly little reward.

In a further discussion of human hunting of orangs, the author's anthropological leaning shows itself at the cost of biological credibility. He argues that

"... hunting on other species of the superfamily Hominoidea, other primates, and subsequently all other 'game' displaying some symbolically interpretable trait may be seen as derivate or redirected forms of the 'predatory' behaviour of man against man".

In other words, man began by hunting his own kind and only later thought of hunting other species. Some of the reasoning behind this novel method of evolving a predator is frankly fanciful:

"The finds of mutilated skulls of Homo erectus at Choukoutien (China) ... and similarly fragmented skull parts of Australopithecines and of H. erectus in Swartkrans (S. Africa) ... suggest that these relatives have been hunted to extinction by more advanced forms, perhaps as a result of head-hunting or cannibalistic traits".

There is no good evidence that the crushing of the skulls is due to anything other than the process of deposition. Even if the brains had been eaten, it does not point to hunting for the purpose of cannibalism: it is good sense to get what energy and protein you can out of a person who has died, whatever the cause of death. And if only one form of hominid has been found, as at Choukoutien (and, by most authorities, at Swartkrans), how by any logical process of thought is one to conclude that it was hunted to extinction by another form which has not been found?
For the most part, however, the text is firmly down to earth. This is especially true of the conservation chapters, in which the author unites impressively a detailed historical knowledge of land use, current assessment of the status of the forest and the relative importance of the different threats to it, and persuasive arguments for its conservation. Ironically, it is precisely that information most necessary to a conservation effort which is the most difficult to obtain: what are the numbers of the endangered species such as the orang, and what are the effects on them of varying degrees of disturbance of the forest? A few species are quite easily censused by the persistent field worker; for instance, the gibbon gives loud songs on most mornings. Most animals, however, whether large or small, are exceedingly difficult to count even within a tiny sample area. Extrapolation from such sample areas to the rest of the forest is rendered very dicey by the variation in forest composition and structure. It is often not possible to find out just what was done to a piece of forest, and it is still harder to classify forests according to their condition.

There is a school of thought which maintains that such census figures should not be published, because they are then either mistaken as gospel truth, or misinterpreted as evidence that the species is not yet in any danger of extinction, or else they provide animal traders with an added stimulus to obtain so valuable a haul together with information on where to obtain it. This school of thought regretfully contains prominent research scientists who ought to think further. The alternative to publication is the public's complete ignorance of the status of endangered species, which is the best way of ensuring the species' extinction. Immediate conservation action needs to be taken at the executive level, of course, but the action is doomed in the longer run without the support of the public. To stonewall the public is to dig the grave of conservation.

Another aspect of the rain forest conservation movement, which has been much debated, is the attempt at reintroducing captive apes into the wild. Rijksen points out that the costly ‘rehabilitation’ centres have conferred benefits. First, because they exist in order to put captives back in the forest, they obstruct the illegal trade in the animals. Second, because the orang is attractive and baby orphan orangs are irresistible, the centres have proved to be useful propaganda organs. Third, the centres provide on-the-spot
education about conservation for those who actually use the forest. But the centres risk introducing new diseases into the wild population; they divert money and possibly attention from the vastly more important task of preventing total destruction of the forest; and they contribute almost nothing to the wild orang population:

“In the five years that the two rehabilitation projects have been operating in North Sumatra, less than 100 individuals have been reintroduced into the wild. This number may be assumed to represent less than 1% of the wild orang utan population is Sumatra. Such a small number of apes will certainly not contribute significantly to the breeding potential of the present population, even if all the animals concerned are mentally healthy, fit to reproduce and, more important, are capable of raising their offspring.”

Rijksen makes it absolutely clear that, although his research concerned the orang, we should not think about conserving the orang, but about conserving the whole ecosystem of which it is merely a spectacular fraction. Species do not exist in splendid isolation. He is under no illusions as to the ultimate threat to this ecosystem. It is not hunting, not trading, not even logging, but simply the hunger for arable land of an exploding human population sweeping all before it. As the advertisement for a bulldozer reproduced in the book so succinctly puts it:

“Yesterday a jungle; tomorrow a town.”

The miserable truth is that the vast, vibrant life force of the rain forest, millions of years old, is pathetically frail before the sudden onslaught of man. Our grandparents doubtless thought of the tropical forests as irreducible, but to our grandchildren they may be just a legend. So it is that those privileged few who have entered this green world have a duty to record everything they see, smell and hear, because they may be the last who have that chance. In this book, Rijksen fulfils his duty admirably.

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